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The cross-cultural adaptation of the Work Role Functioning Questionnaire to Dutch

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Abstract. *Objective*: The study objectives were to perform a cross-cultural adaptation of the Work Role Functioning Questionnaire, a health-related work outcome measure, into Dutch and to assess the questionnaire's reliability and validity in the Dutch context (WRFQ-DV).

Participants: 40 workers with a health problem (duration $>$ one month).

Methods: The WRFQ translation and adaptation were conducted using a systematic approach with the following steps: forward translation, synthesis, back-translation, consolidation of translations with expert committee, and pre-testing. To evaluate the comprehensibility, usability, applicability and completeness of the translated questionnaire, a total of 40 interviews with workers with a health problem were performed.

Results: The questionnaire translation was conducted without major difficulties. During the process, questionnaire instructions were modified and 5 items reformulated based on the participants' responses. Participants were positive on the comprehensibility, usability, applicability and completeness of the questionnaire, and also made suggestions for the further development of the WRFQ-DV. Furthermore, the study shows promising results concerning the psychometric properties of the WRFQ-DV (e.g. Cronbach's alphas for the subscales between 0.70 and 0.91, and good content validity).

Conclusions: The results indicate that the cross-cultural adaptation of the WRFQ-DV was successful and that the psychometric properties of the translated version are promising.

Keywords: Psychometrics, validation, work outcome measure, health condition

1. Introduction

In Europe, the percentage of the working age population with a longstanding health problem or disability (including mental health problems) varies between 5.8% (Romania) and 32.2% (Finland). In the Netherlands, this percentage is 25.4% [1]. Due to demographic, political and social changes, i.e., the ageing workforce, a shift from a workers' compensation model to a work participation model, the increase of retirement age and advances in medical treatment, more persons will likely participate in the labour force with a health problem that may interfere with their ability to accomplish their work [2].

Along with the focus of occupational health research and practice on work disability prevention, the promotion of a sustainable working life attracts more and more attention. Instruments are needed to evaluate interven-

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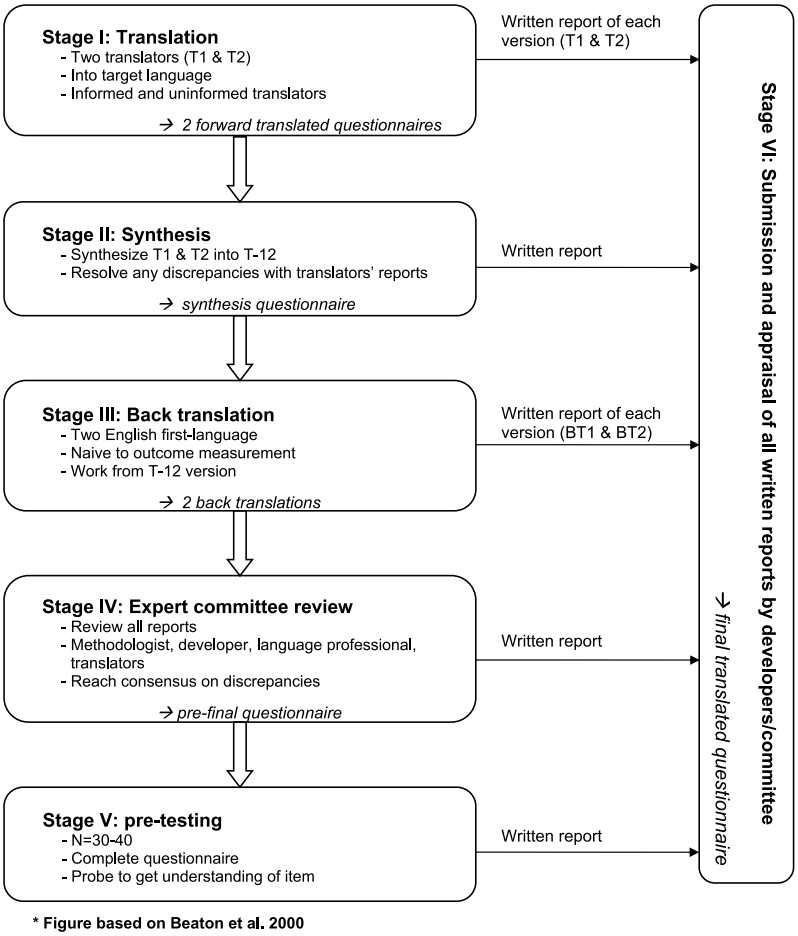

Fig. 1. The cross-cultural adaptation process*

tions aimed at work rehabilitation and the management and prevention of work (dis)ability, and to monitor how health problems impact on work functioning. In the US, instruments have been developed in the 90s, such as the Work Role Functioning Questionnaire (WRFQ), the Work Limitations Questionnaire (WLQ) and the Work Limitations-26 (WL-26) – all based on the same item pool [3–5]. In the Netherlands, no native or cross-culturally adapted health-related work outcome measure is available and validated to assess the impact of a health problem on work functioning.

Because of possible cultural differences in work and health, instruments need to be systematically translated, adapted and validated for its use in other cultural contexts. Guillemin and Beaton [6,7] provide guidelines for the cross-cultural adaptation of questionnaires The approach consists of six steps: forward translation, synthesis, back translation, expert committee review, pre-testing and the formulation of the definitive translated version. Recently, the WRFQ has been successfully cross-culturally translated and adapted for use in other cultural contexts than the US, i.e. the translation to Canadian French [8] and Brazilian Portuguese [9].

The study objectives are a) to perform a cross-cultural translation and adaptation of the Work Role Functioning Questionnaire to Dutch and b) to assess the reliability and validity of the pre-final questionnaire in a pre-test.

2. Methods

The WRFQ's cross-cultural adaptation followed standard guidelines [7] depicted in Fig. 1.

2.1. The cross-cultural adaptation

2.1.1. Forward translation

The forward translation of questionnaire items and instructions was performed by four independent trans-

lators. Of the four translators two were of the research team and the other two were professional and bilingual translators. While the former were aware of the concepts being measured and had previous experience translating questionnaires, the latter had no medical background or knowledge about the WRFQ's concepts.

2.1.2. Synthesis of the translations

To obtain a common Dutch version, the translated questionnaires were compared. When differences in translation were observed, translators and research team members were required to reach consensus. A synthesis questionnaire was developed and a synthesis report was written on the process used, problems experienced and how they were resolved.

2.1.3. Back translation

The synthesis questionnaire was back-translated into English by two other professional, bilingual translators who worked independently from each other. Translators were unfamiliar to the questionnaire concepts and had no medical background. The back translation facilitates examining whether the translation led to semantic or conceptual differences.

2.1.4. Expert committee

To consolidate all the translated versions into a pre-final questionnaire, an expert committee was formed. This multidisciplinary expert committee consisted of a methodologist, (occupational) health professionals, and language professionals. Discrepancies between the original and translated versions were identified and discussed. According to the guidelines [6,7], semantic, idiomatic, experiential and conceptual equivalences were evaluated. Consensus was reached and a pre-final questionnaire was obtained. Again, a synthesis report was written on the process, the problems and how they were resolved.

2.1.5. Pre-test

To evaluate the equivalence and comprehensibility of the translated version a pre-test was performed. A total of 40 participants were included in the pre-test. Inclusion criteria were: the presence of a health problem (minimum duration one month), currently working (8 hours or more), aged 18–65 years and able to read and understand the Dutch language. Workers were identified by their occupational physician and then invited to participate. After completing the WRFQ, a short interview was conducted with each participant. The interview aimed to identify the participants' opinion on the questionnaire's usability, applicability, and completeness. Directly after completing the questionnaire, participants were asked several questions about the wording of the instructions and items, the lay-out, their overall impression of the questionnaire and whether they missed any aspects of their work functioning. All interview data were discussed in the research team and collaboratively decisions were made whether changes in the questionnaire were necessary. The interviews were conducted at the University or at an Occupational Health Service. The length of the interview was on average 30 minutes, including questionnaire completion.

2.2. Work Role Functioning Questionnaire

The WRFQ measures the perceived difficulties in meeting work demands among employees given their physical health or emotional problems [3,10]. The questionnaire consists of 27 items, divided into five subscales: work scheduling demands, physical demands, mental demands, social demands, and output demands. The first two columns of Table 1 show all items and subscales of the original English version. The recall period is 4 weeks and the response options range on a five point scale from 0 = difficult all the time (100%), 1 = difficult most of the time, 2 = difficult half of the time (50%), 3 = difficult some of the time, 4 = difficult none of the time (0%). Another response option 'Does not apply to my job' has been added to enable employees to answer, even though a particular demand is not part of their job. Subscale scores are summed up separately by adding the answers in the subscale, divided by the number of items and then multiplied with 25 to obtain percentages between 0 (difficult all the time) and 100 (difficult none of the time). The scores on 'Does not apply to my job' were transformed to missing values. Subscales with greater than 20% missing data are set to missing. Subscales that had more than 20% missing scores or 'Does not apply to my job' scores were excluded from the analysis [10].

2.3. Evaluation of the psychometric properties of the pre-final questionnaire

Descriptive statistics were used to explore the data (mean, SD, median, range) and the socio-demographic characteristics of the participants. Data were analyzed using SPSS 16 [11].

Table 1
Item level responses of WRFQ-DV ($n = 40$)

Items* (original version)	Sub scale†	n missing/ 'not applicable to my job'	Response n (%)					Mean 1–5 scale	Item to subscale correlation (corrected)
			1 (100%)	2	3	4	5 (0%)		
1. Work the required number of hours	WSD	1/0	6 (15.0)	4 (10.0)	6 (15.0)	12 (30.0)	11 (27.5)	3.46	0.62
2. Get going easily at the beginning of the workday‡	WSD	0/0	6 (15.0)	3 (7.5)	6 (15.0)	12 (30.0)	13 (32.5)	3.58	0.75
3. Start on your job as soon as you arrived at work	WSD	0/2	2 (5.0)	4 (10.0)	1 (2.5)	9 (22.5)	22 (55.0)	3.98	0.38
4. Do your work without stopping to take extra breaks or rests	WSD	0/2	3 (7.5)	7 (17.5)	6 (15.0)	16 (40.0)	6 (15.0)	3.22	0.46
5. Stick to a routine or schedule	WSD	0/1	1 (2.5)	3 (7.5)	2 (5.0)	11 (27.5)	22 (55.0)	4.18	0.50
6. Handle the workload‡	OD	0/0	6 (15.0)	4 (10.0)	5 (12.5)	13 (32.5)	12 (30.0)	3.52	0.79
7. Work fast enough	OD	0/3	2 (5.0)	3 (7.5)	5 (12.5)	12 (30.0)	15. (37.5)	3.65	0.51
8. Finish work on time	OD	0/4	3 (7.5)	2 (5.0)	4 (10.0)	11 (27.5)	16 (40.0)	3.58	0.79
9. Do your work without making mistakes	OD	0/4	1 (2.5)	0 (0.0)	2 (5.0)	13 (32.5)	20 (50.0)	3.98	0.55
10. Satisfy the people who judge your work	OD	0/6	1 (2.5)	4 (10.0)	3 (7.5)	10 (25.0)	16 (40.0)	3.45	0.85
11. Feel a sense of accomplishment in your work	OD	0/0	4 (10.0)	5 (12.5)	6 (15.0)	8 (20.0)	17 (42.5)	3.72	0.85
12. Feel you have done what you are capable of doing‡	OD	0/1	4 (10.0)	5 (12.5)	3 (7.5)	14 (35.0)	13 (32.5)	3.60	0.70
13. Walk or move around different work locations (for example, go to meetings)§	PD	0/17	3 (7.5)	2 (5.0)	0 (0.0)	8 (20.0)	10 (25.0)	2.22	0.72
14. Lift, carry, or move objects at work weighing more than 10 pounds‡	PD	0/13	7 (17.5)	4 (10.0)	1 (2.5)	6 (15.0)	9 (22.5)	2.18	0.48
15. Sit, stand, or stay in one position for longer than 15 minutes while working	PD	0/4	2 (5.0)	2 (5.0)	7 (17.5)	8 (20.0)	17 (42.5)	3.60	0.85
16. Repeat the same motions over and over again while working	PD	0/13	1 (2.5)	5 (12.5)	2 (5.0)	9 (22.5)	10 (25.0)	2.58	0.79
17. Bend, twist, or reach while working	PD	0/6	3 (7.5)	2 (5)	3 (7.5)	9 (22.5)	10 (25.0)	3.42	0.67
18. Use hand-held tools or equipment (for example, a phone, pen, keyboard, computer mouse, drill, hairdryer or sander)§	PD	0/9	2 (5.0)	4 (10.0)	1 (2.5)	6 (15.0)	18 (45.0)	3.18	0.73
19. Keep your mind on your work	MD	0/0	3 (7.5)	4 (10.0)	5 (12.5)	12 (30.0)	16 (40.0)	3.85	0.73
20. Think clearly when working	MD	1/0	2 (5.0)	2 (5.0)	2 (5.0)	19 (45.5)	14 (35.0)	4.05	0.71
21. Do work carefully	MD	2/0	2 (5.0)	0 (0.0)	4 (10.0)	9 (22.5)	23 (57.5)	4.34	0.77
22. Concentrate on your work	MD	0/0	3 (7.5)	3 (7.5)	5 (12.5)	13 (32.5)	16 (40.0)	3.90	0.70
23. Work without losing your train of thought‡	MD	0/0	2 (5.0)	2 (5.0)	8 (20.0)	16 (40.0)	12 (30.0)	3.85	0.78
24. Easily read or use your eyes when working‡§	MD	0/2	0 (0.0)	3 (7.5)	6 (15.0)	12 (30.0)	17 (42.0)	3.92	0.66
25. Speak with people in-person, in meetings or on the phone§	SD	0/1	0 (0.0)	1 (2.5)	5 (12.5)	11 (27.5)	22 (55.0)	4.28	0.58
26. Control your temper around people when working‡	SD	1/2	0 (0.0)	1 (2.5)	2 (5.0)	10 (25.0)	24 (60.0)	4.31	0.56
27. Help other people to get work done	SD	0/10	0 (0.0)	1 (2.5)	3 (7.5)	5 (12.5)	21 (52.5)	3.40	0.49

*Original English WRFQ items;
†WSD = work scheduling demands, OD = output demands, PD = physical demands, MD = mental demands, SD = social demands;
‡Difficult to translate;
§Adjusted after pre-test.

2.3.1. Scale and item internal consistency

Scale mean scores and standard deviations were calculated. To evaluate the internal consistency, Cronbach's alphas were calculated per subscale [12]. An alpha of > 0.70 was considered satisfactory. Item-to-subscale and item-to-total correlations were calculated to evaluate the fit of the item within the subscale and the total score. Moreover, scores on the questionnaires were examined with respect to missing items, distribution of item response scores, and floor and ceiling effects. Floor and ceiling effects were considered present if values exceeded the 15% norm [13].

2.3.2. Validity

The face validity of the Dutch WRFQ was evaluated by the members of the expert committee throughout the cross-cultural adaptation process and through qualitative analysis of the comments provided by the participants of the pre-test.

3. Results

3.1. Cross-cultural adaptation process

The forward translation of the WRFQ was conducted and some challenging idiomatic issues were encountered in the translations of item 2 ('get going easily'), item 23 ('train of thought'), and item 26 ('control your temper'). Item 14 ('pounds') was reformulated to kilograms. Moreover, the single response statement ('Difficult') located at the top of the item list was found to be insufficient. The research team discussed the items in more detail with the professional translators and approached the original author for clarifications regarding the conceptual meaning of these items as well as the formulation of the response statement.

Following the back translation process, some discrepancies between the forward and back translations were observed. These discrepancies pertained to the instructions and the idiomatic equivalence of several items, e.g., item 2 ('get going easily'), item 6 ('workload'), item 12 ('you have done what you are capable of doing'), item 24 ('use your eyes'), and item 26 ('control your temper'). A pre-final questionnaire was produced, in which the instructions were somewhat extended ('I find it difficult to . . . ') and items 2, 6, 12, 14, 23, 24 and 26 were revised or reformulated to reach equivalence between the original and the Dutch versions. Table 1 shows the original items of the WRFQ with the items that showed difficulties in translation marked.

3.1.1. Pre-test

The pre-final WRFQ questionnaire was administered to 40 workers ($n = 25$ women and $n = 15$ men), with a mean age of 49.2 (SD 8.8) years, and who worked on average 27 (SD 9.0) hours per week. More detailed socio-demographic information is shown in Table 2.

About 20% of the participants mentioned that the instructions were not clear in terms of what 'time' in the past four weeks was meant: *all the time* or the *time at work*. After the pre-test the instruction was extended with a sentence to emphasize that it concerned the 'time worked during the past 4 weeks'. Moreover, the sentence explaining the use of the response option 'Does not apply to my job' was modified to be clearer. Although some of the participants also experienced difficulties in answering the items because they had to remember to start each item with 'I find it difficult to', it was decided not to change the lay-out of the questionnaire. Changing the lay-out of the questionnaire would jeopardize the challenge keeping the questionnaire succinct.

Although participants stated that they had no major difficulties in understanding most of the items, five items were changed based on the pre-test results (marked in Table 1). Item 24 ('Easily read or use your eyes when working') was mentioned by 9 participants because they had difficulties understanding what was meant by 'use your eyes'. After discussing it in the research team it was decided to change this item into 'Easily read or process information when working'. Item 25 ('Speak with people in-person, in meetings or on the phone') was mentioned ($n = 7$) to be problematic to answer because the used Dutch word for 'in-person' has two meanings: referring to having a face-to-face conversation or referring to the content of the conversation being personal. The Dutch wording was changed to clarify the first was meant. Item 27 ('Help other people to get work done') ($n = 3$) was also rephrased because of high responses on 'Does not apply to my job'. Items 13 ('Walk or move around different work locations (for example, go to meetings)') ($n = 5$) and 18 ('Use hand-held tools or equipment (for example, a phone, pen, keyboard, computer mouse, drill, hairdryer or sander)') ($n = 7$) were difficult to complete. Participants answered 'Does not apply to my job' because the provided examples did not match with their work. The example in item 13 was left out and the examples in item 18 re-ordered. Although 7 to 9 participants also mentioned having some difficulties with the following items, the research team decided after discussion not to change the items 1 ('Work the required number of

Table 2
Socio-demographic characteristics ($n = 40$)

	Total $n = 40$	Men $n = 15$ (37.5%)	Women $n = 25$ (62.5%)
Age in years, mean (SD)	49.2 (8.8)	52.3 (8.3)	47.4 (8.8)
Education, N (%)			
Low	5 (12.5)	2 (13.3)	3 (12.0)
Middle	9 (22.5)	3 (20.0)	6 (24.0)
High	26 (65.0)	10 (66.7)	16 (64.0)
Job type, N (%)			
Manual	7 (17.5)	4 (26.7)	3 (12.0)
Non-manual	28 (70.0)	8 (53.3)	20 (80.0)
Mixed	5 (12.5)	3 (20.0)	2 (8.0)
Working hours/week, mean (SD)	27.0 (9.0)	31.9 (9.6)	24.0 (7.3)
Disease type, N (%)			
Physical	33 (82.5)	12 (80.0)	21 (84.0)
Mental	4 (10.0)	2 (13.3)	2 (8.0)
Both	3 (7.5)	1 (6.7)	2 (8.0)
Disease duration in years, mean (SD)	8.0 (11.5)	7.5 (13.2)	8.2 (10.6)

Table 3
Description of the scales of the WRFQ-DV ($n = 40$)

	Valid n (miss/not appl)*	Mean (SD)	Range	Median	n (%) at floor (0%)	n (%) at ceiling (100%)
Work scheduling demands	38 (2)	68.8 (22.7)	25–100	75	0	1 (2.5%)
Output demands	37 (3)	70.8 (24.9)	14.3–100	78.6	0	2 (5.0%)
Physical demands	24 (16)	61.1 (24.9)	16.7–100	66.7	0	2 (5.0%)
Mental demands	40 (0)	73.9 (21.9)	4.7–100	79.2	0	6 (15.0%)
Social demands	28 (12)	87.5 (15.5)	50–100	91.7	0	13 (32.5%)
Total score	36 (4)	68.2 (19.4)	20.3–94.4	76.4	0	0

*Subscale scores with more than 20% of the items scoring 'not applicable' or missing are excluded;
Each scale is scored from 0–100, with a higher score indicating a better work functioning (difficulties all the time 0/100; difficulties none of the time 100/100).

hours'), 2 ('Get going easily at the beginning of a workday'), 10 ('Satisfy the people who judge your work') and 14 ('Lift, carry, or move objects at work weighing more than 10 pounds').

When asked, a total of 85% of the participants found it useful to complete the questionnaire. The main reasons mentioned were that the questionnaire provides insight in their situation, and can be viewed as a starting point for a conversation with a professional (e.g., occupational physician, supervisor/line manager). Participants who did not find the WRFQ useful to complete reported 1) the questionnaire had no added value at this point, but it could have had added value earlier in their situation, 2) they already had a clear picture of their functioning at work, and 3) completing the questionnaire did not change their situation. All participants were satisfied with the length of the questionnaire. About 85% of the participants reported that they would like to complete the WRFQ again, mainly to compare their scores and to monitor their work functioning. With respect to the completeness of the WRFQ, 77.5% of the participants stated that the questionnaire was complete. However, almost all participants had suggestions to expand the questionnaire to gain a full overview of their functioning at work. Suggestions made for addition concerned the communication about the disease with co-workers and supervisor/line manager, the influence of work on their health, their life next to work, how to handle work intensification, and how to deal with work accommodations.

3.2. Evaluation of the psychometric properties of the translated version

3.2.1. Scale and item internal consistency

Table 3 shows the mean scores per subscale, with higher scores indicating higher work functioning. The social demands scale has the highest scale scores (87.5, SD 15.5) and the physical demands scale the lowest (61.1, SD 24.9). The proportion of scores at ceiling was lowest for the work scheduling demands scale (2.5%) and highest for the social demands scale (32.5%), which exceeded the 15% norm [13]. No participant scored the lowest score of limited all the time on a subscale. Items with the highest scores of 'Does not apply to my job' were item 13 ('Walk or move around

work locations'), item 14 ('Lifting objects more than 10 pounds') and item 16 ('Repetition of same movements') of the physical demands subscale and item 27 ('Helping others') of the social demands subscale. The response rate per item was excellent with only five missing values in total. Table 1 shows the details of scoring per item.

The Cronbach's alpha's for the subscales were between 0.70 and 0.91. The range of the item-to-subscale correlations per subscale were above 0.46, except for one item in the work scheduling demands scale (0.38) [14]. The correlations between the subscales were from almost zero (0.07) to high (0.85). The correlations of the subscales with the total score were between 0.75 and 0.90, with the exception of the physical demands (0.46).

3.2.2. Validity

The expert committee considered the face validity of the pre-final version of the WRFQ as good. They considered the questionnaire to be complete for functioning at work in relation to health. The participants in the pre-test were also positive on the completeness of the questionnaire.

4. Discussion

The objectives of this study were 1) to conduct a cross-cultural adaptation of the Work Role Functioning Questionnaire to Dutch and 2) to assess the reliability and validity of the pre-final version in a pre-test. The cross-cultural adaptation was performed using a systematic approach [7], including different steps. This resulted in a Dutch version of the WRFQ that equals the original version.

All changes had the purpose to optimize the comprehensibility of the questionnaire and were discussed with the members of the research team and the original author. In the Dutch version the instructions were experienced as insufficient and therefore changed. In the Canadian French and Brazilian Portuguese versions the instructions were also changed [8,9]. Although Gallasch et al. [9] changed the lay-out of the questionnaire (include the expression 'difficult' in each statement), the Dutch version retained the original lay-out. Several items proved difficult to translate and others were changed based on the pre-test. Some overlap is visible with the item translation to Canadian French. For example Durand describes difficulties translating items 2, 6, and 26 and they also removed the examples in the items 13 and 18 based on their pre-test results [8].

Participants' scores in the pre-test were rather high, indicating little difficulties in performing job demands. The absence of floor and ceiling scores ($< 15\%$ with the exception of the social demands subscale) indicates the ability of the questionnaire to distinguish between high and low scores [13] in populations of workers with a health condition, which provides evidence for the content validity. The use of the 'Does not apply to my job' response option was relatively high for the physical demands subscale. An explanation could be that the items in this subscale are more relevant for participants with physical jobs and that our sample consisted of a highly educated sample with most non-manual jobs. Similar results were also found in previous studies [8, 9].

Although both the expert committee and the participants evaluated the Dutch version as complete, several suggestions were made to extend the questionnaire. For example the domain of emotional demands in work and communication with colleagues and supervisors/line managers about the disease were mentioned. Future research should be directed towards the exploration of additional items or domains reflecting today's work.

The results suggest that the Dutch version of the WRFQ has good acceptability and psychometric properties. The internal consistency was good, all subscales had a Cronbach's alpha higher than 0.70. Similar results were obtained with other cross-culturally adapted versions of the WRFQ studies [8,9]. A limitation of the present study is that a majority of the participants in the pre-test had a rather high educational level and had non-manual jobs when compared to the Dutch population [15]. This might pose some limitations for the generalizability of the results to lower educated workers and manual workers. More research in larger and more heterogeneous samples is needed to examine the psychometric properties in more detail (e.g. test-retest, responsiveness and validity).

5. Conclusion

The cross-cultural adaptation process was completed without major difficulties. The translated version of the WRFQ shows promising results with respect to the psychometric properties. This study shows that the WRFQ-DV, a health-related work outcome measure, can be of benefit to researchers and professionals in the field of work disability prevention and rehabilitation. The questionnaire provides valuable information on a persons work functioning.

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